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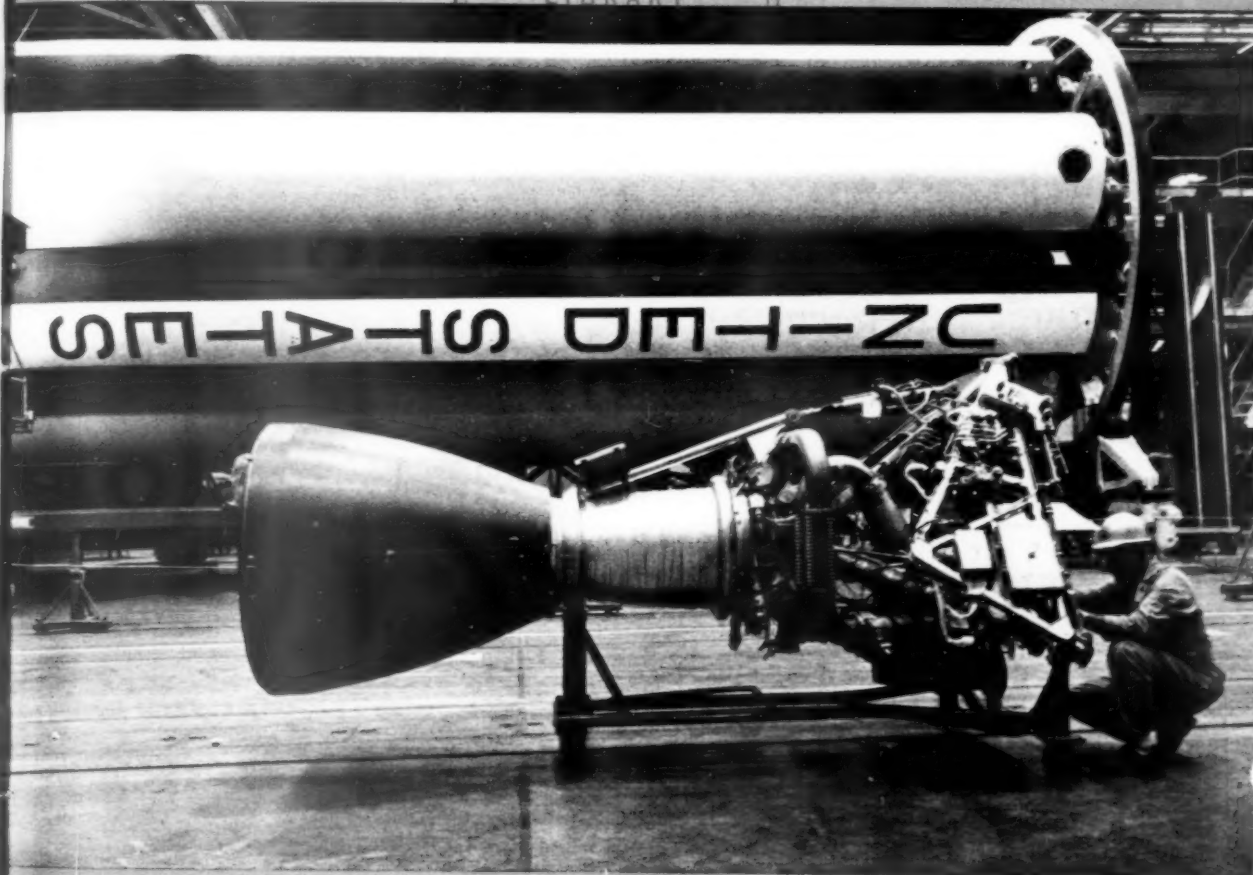
# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



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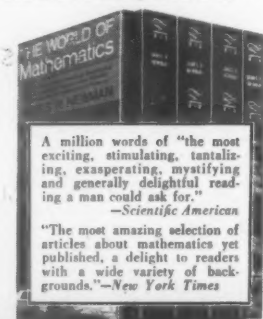
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## PUBLIC HEALTH

# Pauling on X-Ray Dangers

**A Nobel Prize winner cautions against too frequent dental X-rays. Dentists lead the professions in demanding and securing modern X-ray equipment.**

"CHANGE DENTISTS, if the one you have exposes you or your children to full mouth X-rays semi-annually or even annually, as a matter of routine," Dr. Linus C. Pauling, the Nobel Prize winner and chemistry professor at the California Institute of Technology, has advised in an interview.

Dr. Pauling was recently in the news for his opposition to nuclear testing as a hazard to world peace and health.

According to the Nobel scientist, indiscriminate use of X-rays may be a greater health hazard than current exposure to radiation fallout from nuclear weapons tests. The danger from the X-rays is greater for children and embryonic infants known to be more susceptible to radiation damage than other age groups. This is true for all radiation.

Dr. Pauling told SCIENCE SERVICE that an important difference is that X-rays, used judiciously, are beneficial while fallout radiation is not. He believes that complete oral X-rays are warranted only where such diagnostic aid is essential in determining proper treatment.

Leading professional dental and radiological groups, as well as authorities in the U. S. Public Health Service, agree with this. However, dentists and radiologists caution against the other extreme tendency of avoiding X-rays when they are essential.

"As much damage can be done to one's health by completely rejecting the use of dental and medical X-rays as by their injudicious use," a radiologist from PHS warned. But he agreed that the advice offered by the Nobelist was essentially sound.

Dental authorities urge "full disclosure" when a dentist recommends the use of X-rays in any particular instance. "The patient should feel free to ask and the dentist should be willing to explain why X-rays are recommended."

As a matter of fact, studies show that dentists have been ahead of other medical groups in demanding and securing the most modern and efficient X-ray machines and equipment designed to cut down radiation exposure.

In many offices and clinics, leaded aprons are worn during X-ray by the patient as well as the dentist or technician in order to further cut down exposure. Monitoring badges also are commonly worn to measure levels of exposure to office personnel.

According to the U. S. PHS Division of Radiological Health, the 88,000 practicing dentists in the United States are their own radiologists and thus are exposed to far more radiation than any individual patient.

"Enlightened self-interest," therefore, as well as a desire to provide the best in

dental care, underlies the demand of the dental profession for the best and safest X-ray equipment.

PHS inspections of dental X-ray equipment throughout the United States by its field workers are so much in demand that the division of radiological health has devised a "do-it-yourself" testing kit. The kit contains film that is exposed to the machine tested and then mailed back to PHS for analysis.

Following analysis, recommendations are forwarded for correction or improvement of equipment if indicated.

Dr. George Crocker, in charge of the PHS program, used the kits successfully first in Prince Georges County, Md. The technique is well on its way toward nationwide acceptance, according to Dr. Crocker, and will cut down radiation exposure from dental X-rays to a great extent.

New and better machines and fast film have, in the past decade, cut down radiation exposure from dental X-rays by as much as a thousand percent. "We take the position in dentistry and medicine," said one PHS authority, "that no radiation is best and we intend to keep what we must use at a minimum."

Science News Letter, July 16, 1960

## ASTRONOMY

## New Table Shows Hourly Meteor Rates

A TABLE that shows the number of "shooting stars" a trained observer can expect to see during any hour of darkness for any night of the year is now available.

The number varies from zero at 6:00 p.m., local time, on Jan. 1 to 66 at 3:00 a.m. on Aug. 11, when the Perseid meteor

## BIOCHEMISTRY

## Chlorophyll Synthesized

THE FIRST SYNTHESIS of chlorophyll, announced almost simultaneously by research teams in the United States and in Germany, proves that the suspected chemical structure is correct.

Knowing this fact is a prerequisite to further study of chlorophyll chemistry and photosynthesis, said Dr. Robert B. Woodward, the Harvard University biochemist who heads the 17-man research group there.

Future research of the Harvard team will be in the general direction of trying to find out more about chlorophyll and what part it plays in photosynthesis.

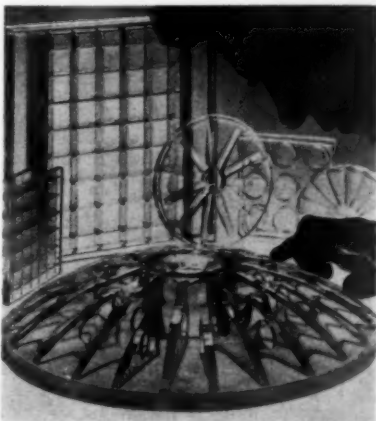
Some scientists believe the green substance serves mainly to transfer energy; others

believe it is at its height, to five at 7:00 p.m. on Dec. 31. The table was compiled by Dr. Charles P. Olivier of the University of Pennsylvania's Flower and Cook Observatory at Philadelphia.

The rates he computed from reports by many hundreds of observers are those that might be seen by a skilled observer at a good station on a moonless, clear night. Since conditions usually fall short of this ideal, the number of meteors actually observed will usually be smaller than shown in the table.

Dr. Olivier also calculated that during the 58-year period on which the table is based, a total of about 294,000 visible meteors could have been seen. The catalogue of hourly meteor rates, published by the Smithsonian Institution Astrophysical Observatory, is available from the U. S. Government Printing Office in Washington, D. C., for fifteen cents.

Science News Letter, July 16, 1960



**OUTER SPACE EYE**—A sandwich-type construction enabled Corning Glass Works to make telescope discs lightweight and compact for use in missiles, satellites and aircraft. The mirrors consist of two fused silica plates, held apart by ribs or tubes of the same material.

believe it has other functions and itself takes part in further chemical reactions.

The Harvard team will try to find out which theory is correct by studying the transformation products of chlorophyll—modified molecules changed by reduction or oxidation reactions.

When asked if his research is slanted toward a practical goal, Dr. Woodward replied, "Definitely not. This is the purest form of basic research."

He also said that he had not been in contact with the German research group but had been familiar with their work for a number of years.

Science News Letter, July 16, 1960

## ELECTRONICS

# "Adam" Computer System

A COMPUTER THAT can reproduce itself and that can improve successive models of itself can, theoretically, be built.

Prof. John Myhill of Stanford University, speaking at the University of Michigan in Ann Arbor, advised students of the possibility of an "Adam" automata computer system.

The mathematics professor said a self-improving series of machines would each have builder, instructor and computer components.

After instructions to reproduce itself and improve its "offspring," the machine would produce a better version of itself.

Each succeeding machine would be better than its predecessor. Its computer would be faster and more efficient. Improvements

mainly would come from the devising of better circuits, as the machines reproduced.

A self-reproducing system already exists at Bell Telephone Laboratories in an electric toy train that takes cars from a siding and reproduces itself.

Prof. Myhill predicted that a self-improving, self-reproducing system "will happen as soon as somebody wants to build a non-trivial self-reproducer, and has the money."

Prof. Myhill was asked if the machines could even become smarter than the men who originated them. He answered that if a computer network can build another network "smarter" than itself, the brain could also build a network smarter than itself.

Science News Letter, July 16, 1960

## METALLURGY

# Metals in Single Crystals

NEW USES for many highly refractory metals and some of their compounds may result from a new process whereby these materials may be obtained in the form of single homogeneous crystals.

Single crystals can be worked at significantly lower temperatures than are normally possible with refractory materials.

The Linde Company, a division of the Union Carbide Corporation, reported the crystals are at present produced as cylinders a quarter of an inch to one inch in diameter and a few inches to over a foot in length.

Complete details of the process are being withheld. However, it is similar in some respects to the Verneuil process for making synthetic sapphires. In this process alumina, aluminum oxide, together with a little coloring matter, is slowly fed as a powder through a very hot combustion flame where

it melts and collects on a pedestal below. This pedestal is slowly lowered as the crystal builds up and a long cylindrical crystal, called a boule, results.

One of the main advantages of the Verneuil flame fusion process is that no container is required for the molten substance. This advantage is reported to be retained in the new process. The heat source, however, is an electric arc rather than a chemical flame, allowing a wider range of temperatures and atmospheres to be used.

Materials so far produced as single large crystals by this process include tungsten, molybdenum, vanadium, columbium, and tantalum among the pure metals, and titanium carbide, titanium monoxide, titanium sesquioxide, and molybdenum disilicide among the compounds.

Science News Letter, July 16, 1960

## GENERAL SCIENCE

# Stifle Self-Expression

"DO-IT-YOURSELF" kits that do not leave much for you to do except read the directions" stifle self-expression, an associate professor at the University of Tennessee told the American Home Economics Association meeting in Denver, Colo.

In design and decorating problems today, Miss Velma M. Riley, who teaches related arts and crafts, said people seem to want packaged answers, like the frozen TV dinner ready to pop into the oven.

"You and I know that 'packaged' answers in interior design just will not work, nor should they! In this push-button age, we seem to be expected to produce push-button answers. I hope we never come to that!"

She urged educators to uphold and strive to raise standards of taste—in effect, to "create dissatisfaction."

Miss Riley said there are some signs

United States taste is improving. "The emergence of the small, simple, economical American car this year, brought about by the impact of foreign competition," she said, "is the healthiest and most heartening sign of our times."

Science News Letter, July 16, 1960

## TECHNOLOGY

# Aid for Peaceful Uses Of Atomic Energy

ELEVEN COUNTRIES will be aided in developing peaceful uses of atomic energy by the International Atomic Energy Agency. IAEA has approved \$320,000 for Afghanistan, Argentina, Brazil, Greece, Iceland, Israel, the Philippines, the Sudan, Turkey, the United Arab Republic and Venezuela.

Science News Letter, July 16, 1960

## PHYSIOLOGY

# Heat or Cold With High Humidity Hurt Hearing

HEAT OR COLD, combined with high humidity, reduce a person's ability to hear well, Prof. Lucia C. Morgan, speech specialist at the University of North Carolina, reported to the Alexander Graham Bell Foundation for the Deaf. Speaking at the Foundation's national convention in Rochester, N. Y., she said research she performed with others at Louisiana State University and other work at Michigan State University disclosed hearing is most keen at 50 degrees Fahrenheit, with a relative humidity of 70%.

Science News Letter, July 16, 1960

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## ASTRONOMY

# Birth of Planets Theory

A NEW THEORY on how the sun's family of planets were born by being torn from the sun's substance when another star passed close by has been proposed.

Dr. M. M. Woolfson, physics department, College of Science and Technology, Manchester, England, suggests a new variation on the old theme that the planets were formed when the sun and another star passed close to each other. This theory was once generally accepted but now is supported by only a few astronomers because the chances of close passage of two stars are extremely small, among other reasons.

A current view of planet formation is that the planets resulted from gravitational attraction in eddies and turbulent areas remaining in the gas and dust surrounding the sun after it was formed.

One new variation in Dr. Woolfson's theory is his suggestion that the material for the formation of the planets was removed from the sun in 12 hours.

Dr. Woolfson's theory is as follows:

At some time in the remote past a star 100 times as massive as the sun passed within a distance of ten times the solar radius. (The solar radius is about 433,000 miles.) As it approached the sun, the passing star raised a tide on the solar surface that increased in height as the star drew closer. Eventually a portion at the tip of this tidal bulge was more attracted by the star than by the sun, and broke off. Pluto, the outermost planet, was the first thus formed.

This loss of material at the solar surface set up waves that traveled around the sun until they reached the region facing the oncoming star. This wave crest was then

torn off to form Neptune, the second outermost planet.

A new wave was then set up, which gave the planet Uranus, and then Saturn and Jupiter were formed in a similar way. At this stage, the star was approaching its closest to the sun and was able to draw material out quite regularly.

That part of this material not captured by the passing star formed the belt of asteroids, or minor planets, that lie for the most part between the orbits of Jupiter and Mars.

Finally, as the stars receded, the four inner planets, Mars, earth, Venus and Mercury, were formed, Dr. Woolfson reports in the British scientific journal *Nature*, 187:47, 1960.

Science News Letter, July 16, 1960

## RADIO ASTRONOMY

# Invisible Comets Plentiful

SOLAR SYSTEM SPACE may be filled with a large number of very small, invisible comets, two Stanford University scientists report.

Drs. P. B. Gallagher and V. R. Eshelman of Stanford's Radioscience Laboratory say their daily measurements of the trails left by meteors showed many more than could be accounted for from known meteors. Meteors are believed associated with past or present comets and are seen as "shooting stars" when they crash and burn in the earth's atmosphere.

At certain times of the year, the earth encounters meteor streams, the debris of

## ASTRONOMY

# Telescope to Be Built In Southern Hemisphere

A NEW TELESCOPE will give, for the first time, exact positions of stars in the southern one-third of the sky. It will be built in the Southern Hemisphere with a \$750,000 grant from the Ford Foundation in New York.

The stellar camera will be operated jointly by Yale and Columbia Universities. It will be as astrophotometer, for measuring the speed and position of stars with great precision.

The only such existing astrophotometer, located at Lick Observatory, Mt. Hamilton, Calif., covers only two-thirds of the sky. The two instruments will permit accurate measurements of stellar motion throughout the Milky Way galaxy in which the sun and its family of planets are located.

Science News Letter, July 16, 1960



**GREAT EAST GATE OF SHECHEM**—Once surrounded by a 35-foot wall, this ancient city of Biblical Palestine is being excavated by Drew University, McCormick Theological Seminary and Harvard University. The pairs of huge stone blocks once had sliding wooden beams between them. On the left are the former guard rooms.

comets, and then the display of "shooting stars" is often spectacular. The Stanford radar studies showed that the high rate of meteors could not be reconciled with the accepted theory of meteor streams.

Instead of a few meteor showers during the year plus a large background of independently traveling particles, the scientists suggest that meteor showers occur frequently but unpredictably, with occasional predictable showers of large particles (the known meteor streams).

The earth crosses the paths of millions of showers as it travels around the sun, they suggest in the *Journal of Geophysical Research*, 65:1846, 1960, published by the American Geophysical Union. The particles producing the trails they studied by radar have a mass a ten-thousandth that producing the faintest visible trail.

Science News Letter, July 16, 1960

## ASTRONOMY

# Spartan King Provides Name for Asteroid

AN ASTEROID first spotted in 1957 has now been officially named Menelaus, for the legendary Greek hero who was King of Sparta and husband of the beautiful Helen of Troy.

The asteroid, or minor planet, previously known as 1957 MK, was discovered by Dr. S. B. Nicholson of Mt. Wilson and Palomar Observatories, Pasadena, Calif. By long-accepted custom, persons who discover asteroids name them. Dr. Nicholson said the name was selected to enable another famous Greek to join his compatriots in the swarm of asteroids to the east of Jupiter.

News of the naming of the asteroid for Menelaus is being sent to astronomers by way of a Minor Planet Circular, issued by the Cincinnati Observatory.

Science News Letter, July 16, 1960

## ENGINEERING

# Colored Highways Ahead

A BRIGHT DAY for motorists is foreseen in the near future, when colored highways may replace the monotonous grays and blacks that are traveled today.

Thermoplastics, made from petroleum gases and mixed with an aggregate such as rock and sand, can be produced in any color. The mixture is rolled and applied as a one-inch surface on pavement already laid. The colors are expected to make it easier to follow highway routes. Colored curbing also is planned to define clearly road boundaries to lessen the danger of running off on a soft shoulder, and to warn of intersections and other danger spots.

Tests on the newly developed materials, which employ the highly versatile plastics, polypropylene, polyethylene and polyisobutylene, are under way at the Esso Research and Engineering Company's research center in Linden, N. J., and are almost ready for full-scale experiments on heavily traveled highways and on airport landing areas.

The colored road coverings are expected to prove of great importance to aviation, as they not only identify different landing

strips but will serve as a guide to private pilots who follow familiar landmarks, such as highways.

Resistance to oil is expected to make the new plastic material valuable to fueling and repair areas of airports, garages, gasoline service stations and other operations where oil-soaked surfaces are potentially dangerous.

In experiments, the paving materials were subjected to the Marshall Stability Test, where core-like samples were placed in a testing machine under 140 degrees Fahrenheit temperature and tested under various pressures, measured in pounds. For light or medium applications 500 pounds pressure is used; for heavy use, 750; for very heavy use, 1,000, and for airport applications, 1,800 pounds.

New formulations have reached stabilities from two to three times higher than these standards.

Under the Marshall test, a 1,000-pound rating equals from 100 to 120 pounds per square inch. A 20-ton truck exerts pressure of about 70 pounds per square inch.

Science News Letter, July 16, 1960

## MEDICINE

# Home Treatment for TB

A "HOME-TREATMENT" experimental program for patients with active tuberculosis has proved highly successful in Mississippi.

Seven years ago, 1,712 victims of active tuberculosis were unhospitalized in that state. Of this number, 90% received no care or treatment of any kind. The state's 783 beds for tubercular patients were almost completely occupied.

But by 1956, this backlog was cleared up. Additionally, nearly 85% of newly reported cases were being treated.

This was accomplished with "isoniazid, in combination with other drugs, and enthusiasm, administered in equal parts," Dr. Durward L. Blakey, Mississippi State Board of Health; and Public Health Service workers, Dr. Raymond Hofstra, Esther Gilbertson and Jewell G. Wyman, report in *Public Health Reports*, 75:507, 1960.

For the large number of patients who could not be hospitalized because no beds were available, the outpatient drug therapy program proved a new hope for restored health.

Local health departments, with the support of county and state health workers and the cooperation of private physicians, were responsible for making the program work.

Because of the poor financial condition of the state, funds needed for drugs had to be obtained locally. Whenever practical, patients were encouraged to contribute something toward the cost of the program. The authors believe these payments, however small, "had a good psychological effect

on the patients, encouraging them to maintain treatment," as well as helping to ease the burden on the local health departments.

Two years after the program was initiated every county in Mississippi was participating. The home care program included patients who had been hospitalized and discharged.

Of this group, 63% were discharged with medical consent as no longer needing treatment. Those who entered the program without prior hospital care and were so discharged numbered only 29%. Hospitalization, therefore, is still recommended "whenever practical."

The study revealed, however, that the simple objectives of the program had been achieved: "to protect the health of the community by reducing the sources of infection and to improve the health of the patients through treatment."

Science News Letter, July 16, 1960

## ELECTRONICS

# Analyzer Combines Best Of Two Computers

A SCIENTIST at the National Bureau of Standards in Washington, D. C., has developed a "differential analyzer" that combines the best features of the two main types of computers, analogue and digital.

The proposed analyzer, developed by H. K. Skramstad of the Bureau's data processing systems laboratory, is expected to be used in simulating the problems met in

designing missiles and aircraft. Combining features of analogue and digital computers provides greater precision in solving such problems than is possible with an analogue computer alone.

The new system has the advantages of high speed and continuous representation of variables obtained with analogue computers and the high precision and dynamic range obtained with digital computers.

Science News Letter, July 16, 1960

## TECHNOLOGY

# Person-to-Person Dialing Next Phone Convenience

DIRECT, AUTOMATIC, long-distance dialing of person-to-person calls promises to be the next advance in telephone communications. The results of New York to Poughkeepsie experiment, in which more than 97% of the personal calls were dialed directly with "enthusiastic acceptance by the customer," were reported by a representative of the New York Telephone Company at the American Institute of Electrical Engineers meeting in Atlantic City. Steady increases in telephone toll traffic prompted the experiment.

Science News Letter, July 16, 1960

## OCEANOGRAPHY

# Undersea Sounds Span 12,000 Miles

UNDERWATER SOUND WAVES from depth charges have been detected at a record distance of 12,000 miles, or virtually half way around the world.

The previous record was approximately 3,000 miles.

Recording of the shots fired from the research vessel, Vema, was reported by Columbia University Seismic and SOFAR station in Bermuda to Dr. Maurice Ewing, director of the Lamont Geological Observatory at Palisades, N. Y.

Acoustic waves from the shots, fired off southern Australia on March 21, reached the Bermuda station in approximately 223 minutes. They traveled through the water, following the sound channel axis near the surface in the south and dropping to depths of about 2,600 feet near the equator.

Science News Letter, July 16, 1960

## METEOROLOGY

# Reports on Weather Modification Research

THE NATIONAL SCIENCE FOUNDATION, Washington, D. C., has made its first annual report on weather modification research carried on under its direction. The report concludes that the past ten years of experiments attempting to determine if man's efforts can change the weather show the answer can be found only through further fundamental research in the atmospheric sciences.

"Practical results should not be anticipated until a store of new discoveries in the laboratory and in the field has accumulated," the report emphasizes.

Science News Letter, July 16, 1960

## METEOROLOGY

# Weather Research Urged

A FAST-MOVING program for weather research was advocated by Sen. Lyndon B. Johnson (D-Tex.). The Senate Majority leader, who is chairman of the Aeronautical and Space Sciences Committee, recommended weather control as an international goal to be promoted by the United States.

Water, or rather the periodic lack of it, in Texas has prompted the Senator's intense interest and concern for scientific progress in weather control.

He told SCIENCE SERVICE that "anyone who has gone through drought and through flood realizes that water is a basic question of life and death itself." He said that the mastery of weather could assure for all drought stricken areas of the world controlled water supplies to be used as needed.

The weather satellite Tiros, developed by the Air Force and successfully launched under the National Aeronautics and Space Administration's program, as well as other more sophisticated satellites, have placed us "on the threshold of an age-old dream," he said.

He underscored the important meteorological revelations on cloud patterns revealed by Tiros which, with other develop-

ments in weather studies, indicate that "some measure of weather control seems ultimately possible."

Sen. Johnson stressed the need for such control to be developed under international auspices. "Any nation that learned to control the weather would have at its disposal an instrument that could be more potent in controlling the earth than even the hydrogen bomb." He proposed, therefore, that outer space explorations in meteorology be a joint prospect for the United Nations.

The recent establishment of a National Center of Atmospheric Research by the National Science Foundation was commended by Sen. Johnson as filling an important gap in the field of weather modification.

The Soviet Union has concentrated a great deal of effort in this direction and has had for many years two such centers.

The new Center working with the Weather Bureau and the National Aeronautics and Space Administration "in this exciting endeavor" soon may make the dream of weather control a reality, Sen. Johnson predicted.

Science News Letter, July 16, 1960

## ROCKETS AND MISSILES

# "Middle-Road" Satellite

THE DEFENSE DEPARTMENT will soon launch a "middle-of-the-road" communications relay satellite. It will be tougher and more complex than balloon satellites being prepared for bouncing radio beams from one spot to another.

But the satellite will not be as difficult to put into its proper orbit as the proposed 24-hour communications satellites, three or four of which would remain stationary over points of the earth and relay messages to and from the ground and each other.

Officials in Washington, D. C., indicate the new satellite may be launched soon, probably within the next few weeks. They say two of the major techniques required for the satellite are well tested.

The "middle-of-the-road" concept places a satellite in a circular orbit at a relatively low altitude—650 miles minimum. Ground stations transmit information to the satellite, where the information is stored on magnetic tape.

When the satellite comes near the ground station to which the message is addressed, it broadcasts the message.

Instructions to the satellite would be in code. A relayed message might also be. Thus the satellite might develop as a nearly invulnerable method of communication.

This system is based on two proved techniques.

The first communications experiment was Project Score. This experiment—in which the President's voice was broadcast from space—demonstrated that voice, teletypewriter and even multiple teletypewriter

signals could be received, stored and then retransmitted by a satellite.

Second, long-lived Tiros, the weather satellite, has proved the reliability of delayed broadcast. From two stations, the satellite can be instructed to photograph any part of the world over which it passes.

After making the photographs, the satellite holds the information and later broadcasts it to the two ground stations.

Score and Tiros have thus advanced the communications art.

Many military leaders are eager to get a communications system into orbit. Army Signal Corps officials say the military has serious problems with global communications through cable and radio facilities.

The facilities are crowded. Cables can be cut. Shortwave radio can be upset by atmospheric conditions.

Thus the Defense Department has set out to put up a communications satellite, with payload developed by the Signal Corps. The satellite is part of Task COURIER, first phase of Project NOTUS.

The Air Force will place the satellite into orbit with a two-stage rocket. Army-built stations in various parts of the world will relay messages through it.

The satellite must transmit and receive information very rapidly as it passes the stations. It will have a message capacity equivalent to 20 teletypewriter channels, each operating continuously at a rate of 100 words per minute.

Science News Letter, July 16, 1960

## TECHNOLOGY

# One-Eyed Robot Hunts Objects Lost in the Sea

A ONE-EYED, SWIMMING ROBOT with powerful claw-like pincers is being developed for hunting and retrieving objects lost in the ocean at depths up to 2,000 feet.

Solaris, as the robot is called, has propellers for motion. When its TV eye spots some object on the ocean floor, an image of the object is flashed to a monitoring screen aboard a surface ship, from which operators, by remote control, guide the 500-pound robot to its prey and make it clamp the find in its claw.

At a depth of 1,600 feet, Solaris can patrol an area equal to 270 football fields at one anchoring of the surface ship. Normally the TV camera can see 15 to 25 feet. Under ideal conditions it can spot a one-inch-diameter cable at 50 feet. Any object weighing 7,500 pounds or less in water can be hauled up to the surface.

In turbid waters, a sonar system helps the TV eye—enabling operations to continue in spite of bad underwater "weather."

Designed by Vitro Laboratories in suburban Silver Spring, Md., a Solaris is now being built for recovering torpedoes from the test range operated by the U. S. Naval Torpedo Station at Keyport, Wash. It is believed the robot could also be used to recover spent solid-fuel rocket boosters.

Science News Letter, July 16, 1960



**UNDERWATER ROBOT**—Vitro Laboratories' Solaris retriever is ready to recover a torpedo. Solaris can "nail" itself to unwieldy objects, pull up scrap iron with electromagnets, plant explosives, tend nets or scoop up cable or pipe for inspection.



## GENERAL SCIENCE

**No Major Changes in Nuclear Disarmament**

NO SHARP DEPARTURE from current United States proposals on nuclear disarmament, other than "some refinements," can be expected before next year.

President Eisenhower made this clear in answer to a question from SCIENCE SERVICE at his news conference. The President said that the plan that the U. S. would have submitted to the Russians on the day they walked out on the 10-nation East-West Geneva disarmament conference "is now undergoing some refinements, and that's all there is to be done."

The President took an optimistic view of the discussions at Geneva by the representatives of the five nations "on our side" without the five-member communist delegation. He said that "this gives them such a fine opportunity to refine and agree upon details of the plan."

Current East-West meetings on nuclear testing, which are separate from the disarmament conference, are not expected to break down via another Soviet walkout, according to President Eisenhower. "There is not yet any indication that they intend to walk out on these particular negotiations."

The President's optimism is shared by the Department of State, whose spokesman Lincoln White said a continued refusal by the USSR to negotiate on disarmament is "inconceivable."

Neither the President nor the State Department indicated what action would be taken by the United States or her allies to resume the talks with Russia.

Although the President reaffirmed that the U. S. no longer considers itself bound to refrain from further nuclear testing, he said "we could afford to stand for a few more months without testing," if there is sufficient assurance of progress on current negotiations. In any event, he pledged that "we will not test in the atmosphere" or do anything to pollute it.

Science News Letter, July 16, 1960

## PUBLIC HEALTH

**Russia's Poisoned Rivers Endanger Public**

RUSSIAN NEWSPAPERS reaching England show that the Russians are becoming alarmed at the pollution of the nation's 225,000 miles of rivers, which is killing fish and endangering public health.

Soviet scientists have called for action to stop industrial plants from dumping waste products and for long-term planning covering all branches of industry and public health organizations.

The dumping of waste is reported to be damaging the fishing industry to the extent of about a quarter of a billion dollars a year.

The newspaper Literature and Life says: "Fish and vegetation are perishing. The health of the people is in real danger. And all this is taking place because sanitary laws are being violated by too many administrators."

The newspaper argues that the cause of the trouble is the "so-called norms" providing for the "maximum allowable poisonous concentration" that can be thrown into the rivers. The paper says the norms concede that the dumping of waste products into the rivers is necessary and unavoidable, instead of trying to tackle the problem by neutralization, destruction and filtering.

Another newspaper to air the problem is Komsomolskaya Pravda, organ of the Young Communist League. It states that scientists recently analyzed large sections of the northern Donetz River, the "Ruhr of Russia," with its mines and fast-growing chemical and steel industries.

The scientists found that dirty water, including poisonous substances, is being poured into the river at the rate of more than 36,000,000 cubic feet a day by sugar, chemical and steel plants.

"Dead rivers," which have been officially written off as unable to support fish and vegetation as a result of too much dumping, are feeding water into the upper Donetz.

Science News Letter, July 16, 1960

## METALLURGY

**High-Purity Beryllium Refined From Scrap**

HIGH-PURITY BERYLLIUM that contains less than one-half a percent of undesirable materials, to meet space age requirements, can be obtained by electrically refining beryllium scrap metal, the Department of Interior's Bureau of Mines reported in Washington, D. C. Beryllium's important uses are in nuclear reactors and in temperature-resistant materials for missiles and satellites.

The new method, developed by three scientists at the Bureau's Metallurgical Research Laboratory in Boulder City, Nev., uses what is known as the fused-salt process. Use of the technique for refining other metals is under investigation.

Beads of beryllium are used as an anode in the bottom of a special air-free electro-refining cell of the type developed by the Bureau to refine titanium. Molten salts of potassium, lithium and beryllium serve as the electrolyte. Crystals of the near-pure beryllium form on the cathode much as rock candy builds up on a string.

The investigations on beryllium refinements were made by M. M. Wong, F. R. Cattoir and D. H. Baker Jr.

Science News Letter, July 16, 1960

## ENGINEERING

**Scientists, Technicians To Study Blast Site**

SCIENTISTS AND TECHNICIANS this summer will study an Alaskan area surrounding the mouth of the Ogotoruk Creek that flows into the Chukchi Sea to determine whether it will be safe to blast a ship harbor there with nuclear devices. Tentatively planned by the Atomic Energy Commission for 1962, the excavation project would employ five underwater nuclear explosives.

Science News Letter, July 16, 1960

**IN SCIENCE**

## GENERAL SCIENCE

**Many American Leaders See No Nuclear War Soon**

NUCLEAR WAR could break out within 20 years but it is not probable in the near future. This is the opinion of American leaders in many fields, expressed in a poll conducted by the National Planning Association, Washington, D. C.

The poll was completed before the U-2 incident and the collapse of the summit conference.

The Association sent questionnaires to 944 members of its board of trustees, national council and standing committees. The 396 who answered represented agriculture, business, labor and the professions.

Seventy-two percent said nuclear war was possible but not likely by 1980. Twenty percent said it was highly improbable. Only six percent said nuclear war was likely.

Seventy-five percent recommended that international inspection and control machinery be managed by the United Nations. Seventy-three percent said the United States has more to gain than lose from a fully enforced international ban on nuclear weapons testing.

Science News Letter, July 16, 1960

## INVENTIONS

**New Patent May Doom Baseball's Umpires**

BASEBALL'S FAMILIAR BATTLES with the umpire may be doomed. An automatic umpire has been patented.

If the system is adopted, the third man at home plate will doff his heavy padding, retreat to a control room full of push buttons and television monitoring screens and forget about jeers and pop bottles.

The "automatic baseball umpire or the like," as inventor Lloyd F. Knight of Levittown, N. Y., has titled it, was granted patent No. 2,943,141 and was assigned to Servo Corporation of America, New Hyde Park, N. Y.

The "umpire" is really a system of television cameras. To watch batting action, one camera looks down on home plate and two others look in from the sides.

In the monitoring booth the umpire can tell whether the pitch is over the plate and between the batter's knees and shoulders. An image-freezing device makes it possible to re-run the action until any dispute over the monitoring umpire's decision is settled.

Each base is watched by three cameras strategically placed around the field and similarly equipped with freezing devices.

"With my device," says inventor Knight, "arguments . . . should be reduced to an absolute minimum."

Science News Letter, July 16, 1960



# CE FIELDS

## ZOOLOGY

### Sea Snails Anesthetized By Water-Rigor Method

PHYSIOLOGISTS in the Union of South Africa have solved a long-standing research problem—how to anesthetize a salt-water snail.

These creatures are rather resistant to anesthetics. They can be rendered insensitive to pain, but even when so heavily drugged that they do not recover, their powerful muscles will not relax. These muscle contractions make experimental surgery almost impossible.

Dr. A. C. Brown of the University of Cape Town noticed that marine snails lose their ability to crawl and cannot move at all if they come too far inland where fresh water dilutes the salty sea.

Taking this clue into the laboratory, Dr. Brown and a colleague Dr. B. J. Krijgsman, also of the University, found that muscle contractions in two snail species, *Bullia digitalis* and *Bullia laevis*, could be completely eliminated by reducing the salinity of their watery environment. The distilled water, added gradually to the sea water, seeps into the snail's body tissues by a process known as osmosis.

With tissues swollen to the point that muscles cannot move, the stiffened snail is in a state of "water rigor," and can be operated upon successfully. Remaining in this state for several hours has no apparent ill effect and, once back in sea water, the animal recovers and behaves normally.

The physiologists, reporting in *Nature*, 187:69, 1960, believe the "water rigor" technique, which they used to study the nerves, might find a wider application in the field of gastropod physiology.

But one question is still unanswered: How do you anesthetize a fresh water snail?

Science News Letter, July 16, 1960

## GENERAL SCIENCE

### Scientists Fail To Inform Society

SCIENTISTS have failed in their responsibility to undertake "an independent informative role" in political, economic and social affairs involving science, a special committee for the American Association for the Advancement of Science states.

This failure has contributed to a crisis that "may disrupt the history of man," the AAAS warned in a major policy statement in which it urged scientists to speak out and inform the public on key issues. The report appears in *Science*, 132:68, 1960.

According to the statement, scientists have "a serious and immediate responsibility" to provide the public with facts on the control of nuclear energy, disarmament, population control, the role of scientific

research in international military and political rivalries, the biological effects of food additives, and the social consequences of automation.

The statement resulted from "more than five years of discussion and study within the AAAS." It was drafted by the AAAS Committee on Science in the Promotion of Human Welfare. The committee recommended that on any major issue relating to science, the AAAS should:

1. Stimulate discussions within the scientific community and provide guidance for the development of a specific program.

2. Prepare reports for the scientific community on all relevant data and the consequences likely from alternative courses of action.

3. Translate the scientific report into lay language for distribution "through all available channels."

4. Develop more contact on a local community level between scientists and the public.

Science News Letter, July 16, 1960

## AGRICULTURE

### New Technique Lowers Corn's Evaporation Rate

A NEW TECHNIQUE promises to let farmers use less water in growing crops. Scientists in Urbana, Ill., have already grown corn with a third less water than required for corn on which the technique was not used.

The scientists from the Illinois State Water Survey and the University of Illinois Department of Botany used a fatty alcohol that forms a film a molecule thick on water surfaces and has been used previously by Water Survey engineers to reduce evaporation from water supply reservoirs.

But in the new work, the scientists introduced the chemical to the roots of the corn plants. With the chemical, the rate of water evaporation from the plants was 17% to 40% lower than for corn grown in untreated soil.

The Water Survey engineer who originated the project, W. J. Roberts, suggests the technique may eventually increase the usefulness of available water in areas where the supply is limited.

The scientists believe the chemical forms a protective film at the openings in the plant from which water evaporates. They plan to use fatty alcohol tagged with radioactive tracers to test this theory.

Science News Letter, July 16, 1960

## CHEMISTRY

### Poultry Disease Helped By Chemical Weapon

A CHEMICAL weapon against minute parasites that get into the digestive systems of poultry is reported in the *Journal of the American Chemical Society*, 82:2974, 1960. The chemical is amprolium. It can be put into the feed and affords adequate protection against coccidiosis, the parasitic disease costly to poultry growers. In laboratory tests amprolium in feed has been effective against infection from three types of parasites.

Science News Letter, July 16, 1960

## PSYCHOLOGY

### "Horn" Thought to Play Big Role in Memory

A HORN-SHAPED segment of the brain may decide what is worthwhile remembering and help recall the information when situations demand the information.

Experiments by Dr. Ross Adey of the University of California Medical School, Los Angeles, suggest this role for the segment, the hippocampus.

One activity of this brain segment may be to "approve" an incoming message, or stimuli, for permanent deposit as a memory trace in an appropriate neural system. Furthermore the hippocampus may assist in recalling the item of information in a conditioned learning—goal-directed—situation.

Experiments showed that certain rhythmic waves from this brain segment provide a sensitive correlate of the animal's ability to engage in goal-directed performance. This involved training the animal to approach a food reward in a maze box.

When the animal responded as he had been trained, the rhythmic waves seemed to signal his correct approach to the reward. Drugs which caused the animal to forget his training for a time so that he wandered aimlessly about led to abrupt change in wave patterns. The rhythmic pattern returned when the animal again responded as it had been trained.

This rhythmic pattern from the hippocampus probably helps a person drive to work each day over a familiar route. The unconscious cues that tell where to turn were probably indelibly inscribed in the brain with the help of the hippocampus. And as long as this rhythmic brain wave persists the driver will not make a wrong turn.

Science News Letter, July 16, 1960

## OCEANOGRAPHY

### Use of Civilians in Navy Research Urged

THE NAVY'S research ships should be manned by civilian crews, the National Research Council-National Academy of Sciences recommends in a special report.

The Committee on Oceanography, in Washington, D. C., says the use of Navy crewmen results in excessive turnover of personnel and time wasted observing "a whole host of regulations that are necessary only for combat ships."

The committee also recommends that the crew be employed by and responsible to the laboratory in charge of the ship, rather than to a part of the Department of the Navy. "This practice could reduce ship operating costs, as Navy crews are usually considerably larger than civilian crews."

Research on subsurface currents and the ocean floor will greatly increase United States submarines' effectiveness, the committee reports. Dr. Harrison Brown, professor of geochemistry at the California Institute of Technology, is chairman of the committee.

Science News Letter, July 16, 1960

## ROCKETS AND MISSILES

# U. S. Hopes Pinned on Saturn

A communications satellite system and manned flight plans depend on the Saturn rocket. So does America's hope of passing the USSR in payload size and weight.

By W. T. M. GRIGG

## See Front Cover

ABOUT A HALF HOUR before the big test, engineers in coveralls and yellow or blue helmets gathered on a hill about 2,000 feet from the first stage of the Saturn rocket. Before them, held by a tower of steel and concrete, stood the booster.

Eighty feet tall, 22 feet in diameter, the booster dwarfed a full-sized Jupiter rocket standing nearby. The Saturn booster, in fact, dwarfs any of the free world's rockets and is more powerful than anything the USSR is known to have tested.

The Saturn test would be static. A sturdy tower of steel and concrete would do what seemed impossible: hold the booster to the ground.

As the crowd gathered, the hill at Huntsville, Ala., began to look like a picnic. Dr. Wernher von Braun, director of Huntsville's Marshall Space Flight Center, joined the group.

Bells rang at the booster area. Finally, a siren screamed.

Dr. von Braun was called to a mobile telephone.

"They've found a man in there," a photographer joked.

Within a few years, it is planned, there will be not one man but two or three in a capsule atop the completed Saturn. The rocket will be able to carry a team of astronauts into orbit around the earth or on a trip around the moon and back to earth. (Two of America's Mercury Astronauts, Air Force Captains Leroy Gordon Cooper Jr. and Donald K. Slayton, flew in to witness earlier static firings.)

"But if there was a man 'in there' at this test, Dr. von Braun did not mention it as he returned from his call.

## Area Soaked Before Test

Thousands of gallons of water began to spray the area the booster's exhaust would hit. The water would moderate the exhaust's heat.

Then, the count-down.

At zero, a roar. The trembling booster shot flame. Deflected, the flame shot 200 feet into the air at an elbow angle to the rocket.

The observers felt their insides shake. The whole hillside trembled.

For more than two minutes, the booster roared on. The test was only the second in which all eight engines were used. The first had been stopped after 110 seconds.

The flame petered out and the test was over. Dr. von Braun, his blond hair ruffled, said, "We're in the money."

He said the booster had been run until its fuel—liquid oxygen and kerosene—was exhausted. None of the couple of hundred monitoring devices had revealed a danger that required the test to be stopped.

The duration of the test was announced by loudspeaker: 122 seconds.

The exhausted Saturn was now quiet. An 80-foot booster like this one will be only the first stage of the Saturn rocket. But this one stage can develop 1,500,000 pounds of thrust—equivalent to 30,000,000 horsepower.

Each of this stage's eight engines is a modified version of the Jupiter-Thor engine. They are powered by kerosene fuel and oxygen in nine massive tanks.

The completed Saturn C-1 will stand nearly 200 feet tall, about a third as high as the Washington Monument. Yet it will, hopefully, take off.

On its flight depend U. S. hopes for beating the USSR in payload and the accomplishment of a soft landing on the moon, several flights by man and an advanced system of communications satellites capable of instantaneous transmission of television, telephone or telegraph signals to any point on earth.

The Saturn rocket could also place sizable payloads on Mars or Venus. The Saturn C-1 will be able to orbit payloads of 23,000 to 25,000 pounds.

With the first series of static firings now complete, the Saturn booster is now being

modified to make it more like a rocket for flight. Skirts, pressurization equipment and other hardware are being added.

About the end of July, a second series of static firings will begin.

Dr. von Braun expects the booster to meet this schedule:

1. There will be a sub-orbital flight test of the first stage in the summer of 1961. In this test and in two in 1962, the first stage will be real, but top stages will be dummy models of the second and third stage rockets to be added later.

2. In late 1962, the first of three sub-orbital shots will be made using the first stage, an active second stage and a dummy third.

3. In the latter part of 1963, the first of three test flights of the three-stage Saturn will take place. These flights will be orbital and will be in support of the National Aeronautics and Space Administration's manned space flight program.

4. After a tenth flight test in 1964, the Saturn will be operational.

## Reusable Booster Saves Money

In the early flight tests a system of parachutes and retro-rockets will permit recovery of the first-stage booster. After rust is removed and damage repaired, the booster will be used again—a major saving to the taxpayer.

The first-stage booster of the Saturn launch vehicle and 188,000-pound Rocketdyne H-1 engine in the Fabrication and Assembly Laboratory at Huntsville, Ala., are seen on the front cover of this week's SCIENCE NEWS LETTER.



**GOING NOWHERE**—The free world's mightiest booster, the Saturn, roars and thunders but is held to the ground in a test of its eight engines. Additional hardware, such as skirts and pressurization equipment, are now being added for a second series of static tests. Then—flight.

Recovery and re-use of a rocket is not completely new, but the U. S. has not attempted it on a booster even approaching the size of Saturn.

The Saturn project, begun in August, 1958, has so far cost about \$100,000,000. Over a year's work has already gone into developing a digital computer to go on board the Saturn. It will be a small box about two feet high with magnetic drum memory.

It will direct Saturn's actions, correcting deviations that might prevent the rocket from continuing on its proper flight path. The computer will be versatile enough to handle all the different flights now being planned for the rocket.

A bigger computer, the first IBM 7090, has just been put into use at Huntsville for Dr. von Braun's team.

Known data about the Saturn rocket and space conditions can be so combined in the computer that it produces simulated flight tests for studies of the Saturn's potential. A second 7090 is planned and, later, a giant Stretch computer not yet built may be used.

Without these giants, rocket development would be greatly slowed, Dr. von Braun has indicated. They are helping speed Saturn to the launching pad.

A second booster is already being built at Huntsville for the flight tests. It will be assembled and static-fired here and then transported to Cape Canaveral for that first test next summer.

Right now, the Huntsville experts say the schedule will be met. With such satisfactory static firings as those already made, this is likely.

Thus, the U. S. may be able to pull ahead of the USSR in terms of payload

weight and size within a few years, unless the USSR is willing to spend time and money on extremely large rocket boosters with little military usefulness. But the USSR may be willing.

Here are Dr. von Braun's observations on the booster race:

"From the information I have, I must conclude that the Russian large rocket program started solely as a military program, with Stalin himself making the decision that he did not care how big the rocket would be to carry an atomic warhead across the ocean, he just wanted one and he wanted it quick.

"The scientists apparently tried to get some of the new rockets for their purposes and were turned down. Apparently they were turned down time and again because the military felt this space science project would distract from the military effort.

"But at the end the scientists got a rocket and Sputnik I went into orbit.

"The payoff in political propaganda was so high that now the scientists can get anything they want."

The Russians have already fired several rockets with about half the thrust of the Saturn (one and a half million pounds). Dr. von Braun believes they are at work on bigger ones:

"Now, whether their new rocket will have a million and a half or two million or three million pounds of thrust or only one million, this I don't know, but I consider it very likely that they are busy at this very time developing a rocket at least the size of Saturn."

Science News Letter, July 16, 1960

## PSYCHOLOGY

# Personalities and Smoking

A STUDY of 2,360 men reveals that the average cigarette smoker, pipe smoker, non-smoker and ex-smoker have personalities that differ from each other. Cigarette smokers, for instance, are more outgoing than pipe smokers and non-smokers.

The authors of the study say the results do not prove that smoking does not cause lung cancer, but they make more reasonable the proposition that both smoking and cancer may be related to certain underlying hereditary factors.

The study was made by Dr. H. J. Eysenck of the Institute of Psychiatry in London and research workers of Mass-Observation Ltd. They report that their study lends support to the idea that extroverts may "live at an accelerated rate, drinking harder, smoking harder, living more irregular lives, staying up longer and generally 'living it up' more.

"They may thus lower their resistance to disease and expose themselves more to conditions which may directly cause the disease in question."

In the study, reported in the British Medical Journal, May 14, 1960, 31 questions were asked the men. These included:

1. Would you rate yourself a lively individual?
2. Are you frequently lost in thought,

even when you are supposed to be taking part in a conversation?

3. Do you always prefer the familiar, the safe and sure, to taking chances with the new and untried?

4. Do you have any habits like chewing pencils or biting fingernails or things like that?

The answers showed a pattern of extroversion among the cigarette smokers, the researchers found. The answers also "weakly confirmed" the idea that smokers had less rigid personalities than others.

From the study, "ex-smokers emerge as the most neurotic; smokers as a whole do not appear to be more neurotic than non-smokers."

Among smokers, heavy smokers were more extroverted than medium smokers (15 to 24 cigarettes daily). The medium smokers, in turn, were more extroverted than the light smokers.

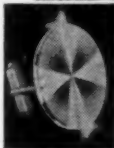
Ex-smokers' extroversion averaged between that of light smokers and medium smokers. Non-smokers averaged out as less extroverted than even the light smokers. And pipe smokers were more introverted, on the average, than any of the other groups studied.

Science News Letter, July 16, 1960

## OPTICAL BARGAINS

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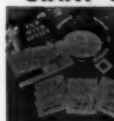
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**BEEKEEPING**—John E. Eckert and Frank R. Shaw—*Macmillan*, 536 p., illus., \$12.50. Successor to "Beekeeping" by Everett F. Phillips. Offers up-to-date working knowledge of the biology, life history and habits of bees, as well as of the proper use of equipment and manipulative practices in their management.

**BIOLOGICAL AND MEDICAL ELECTRONICS**—Ralph W. Stacy—*McGraw*, 308 p., illus., \$9.50. Text and reference for biology and medical students, covers advances in the field of modern electronic apparatus, including special chapters on transistors and computers in the laboratory.

**BOTANY**—M. K. Hage, Jr. and M. Vere DeVault—*Steck*, 48 p., illus., by Carol Rogers, \$1.75. Elementary science of growing plants, illustrated by experiments.

**CASSEL'S NEW LATIN DICTIONARY**: Latin-English, English-Latin—D. P. Simpson—*Funk*, rev. ed., 883 p., thumb-indexed, \$7.75; plain, \$7. Following the tradition since its first appear-

ance more than a century ago, this latest revision adheres to "classical" Latin, while following present-day usages in Latin spelling and English idiom.

**CHEMICAL AND NATURAL CONTROL OF PESTS**—E. R. de Ong—*Reinhold*, 244 p., illus., \$7.50. To assist research worker, instructor, farmer and manufacturer in evaluating the most effective combination methods of pest control. Stressing the importance of natural control of pests, author shows that nature, unaided by chemical supplements, cannot provide the degree of extermination necessary to maintain our high standards of production.

**CLASSICS OF MEDICINE AND SURGERY** (formerly titled: *Epoch-making Contributions to Medicine, Surgery and the Allied Sciences*)—Collected by C. N. B. Camac—*Dover*, 435 p., illus., paper, \$2.25. Reprint of 1909 collection of unabridged text by Lister, Harvey, Jenner and other epoch-making scientific investigators.

**EXPERIMENTS AND OBSERVATIONS ON THE GASTRIC JUICE AND THE PHYSIOLOGY OF DIGESTION**—William Beaumont, with biographical essay "A Pioneer American Physiologist" by Sir William Osler—*Dover*, 320 p., paper, \$1.50. Facsimile reprint of the original edition of 1833.

**THE FIRST BOOK OF AUSTRALIA**—Edna Mason Kaula—*Watts*, F., 64 p., illus., by author, \$1.95. Attractive introduction for youngsters to the continent Down Under, its people, cities, aborigines, products and animals.

**FUNDAMENTALS OF ROCKET PROPULSION**—Raymond E. Wiech, Jr. and Robert F. Strauss—*Reinhold*, 135 p., illus., \$5.50. Concise and clear presentation of the principles of operation of the rocket, its capabilities and its limitations, written for both the student and the layman.

**FUNDAMENTALS OF TRANSISTOR PHYSICS**—Irving Gottlieb—*Rider*, 146 p., illus., paper, \$3.90. Text provides analysis of the action of semiconductors from the physics viewpoint, using descriptive narration rather than mathematical approach.

**GASDYNAMIC DISCONTINUITIES**—Wallace D.

Hayes—*Princeton Univ. Press*, 68 p., paper, \$1.45. Covers the basic theory of gasdynamic discontinuities, the normal shock wave, internal stability considerations and the physics of shock waves.

**GEODETIC USES OF ARTIFICIAL SATELLITES**—George Veis—*Smithsonian Contributions to Astrophysics (GPO)*, 62 p., illus., paper, 65¢ direct to Govt. Printing Office, Washington 25, D. C. Presents geometric method of using satellites in geodesy by performing a triangulation in space and determining the positions of a number of observing stations whose positions are unknown.

**GHOST SHIP OF THE POLE: The Incredible Story of the Dirigible Italia, an International Tragedy That Has Shadowed a Man and a Nation for Thirty Years**—Wilbur Cross, foreword by Vilhjalmur Stefansson—*Sloane*, 304 p., photographs, maps, \$5. Story of the Arctic disaster, based on research and interviews.

**THE GOLDEN BOOK PICTURE ATLAS OF THE WORLD**, 3 Vols.—Philip Bacon, Ed.—*Golden Press*, 577 p., more than 1,000 color photographs and maps, boxed set \$10. Invites young and old to take a colorful trip, seeing and reading about the geography and resources, agriculture, industry, people and cities of North and South America, Europe and the U.S.S.R., Asia, Africa, Australia, Oceania, Arctic and Antarctic.

**A HISTORY OF GREEK FIRE AND GUNPOWDER**—J. R. Partington, foreword by Sir Frederick Morgan—*Barnes & Noble*, 381 p., illus., \$13.50. Concise, fully annotated historical survey of the development of firearms from the early use of incendiaries in warfare, through the fires of Mark the Greek, gunpowder in Europe, Muslim lands and China, to the use of saltpeter.

**THE IMAGE OF THE CITY**—Kevin Lynch—*Technology Press & Harvard Univ. Press*, 194 p., illus., \$5.50. Examines the urban landscape, looking at three American cities: Jersey City, Los Angeles and, in particular, Boston. Offers some first principles of city design. Book itself is beautifully designed.

**LAND FOR THE FUTURE**—Marion Clawson, R. Burnell Held and Charles H. Stoddard—*Jahns Hopkins Press* for Resources for the Future, 570 p., \$8.50. Authors examine the changing uses of land in the United States, historically, at present and in the light of expectations extending to the year 2000.

**THE LICHEN FLORA OF THE UNITED STATES**—Bruce Fink, completed for publication by Joyce Hedrick, foreword by Alexander H. Smith—*Univ. of Mich. Press*, 426 p., 47 plates, \$12.50. This reissue of manual published in 1935, though in some respects out of date, is still fundamental to the study of lichens.

**LIFE IN THE SHIFTING DUNES**—Laurence B. White, Jr.—*Museum of Science, Boston*, 84 p., illus., by Henry B. Kane, paper, \$1.75. Field guide to the natural history of Castle Neck, Ipswich, Massachusetts, showing the complex relationships of living animals and plants to their environment.

**LIQUID PROPELLANT ROCKETS**—David Altman and others—*Princeton Univ. Press*, 189 p., illus., \$2.95. Treats high temperature equilibrium, expansion processes, combustion of liquid propellants and the liquid propellant rocket engine.

**THE MARINE FISHES OF RHODE ISLAND**—Bernard L. Gordon—*Book & Tackle Shop*, 135 p., 80 photographs by author, \$4. Guidebook to the 215 species of salt-water fish found in Rhode Island coastal waters, in an unusual combination of salt marshes, estuaries, salt water ponds, rocky shoals and open sea.

**MARINE SALVAGE OPERATIONS**—Edward M. Brady—*Cornell Maritime*, 237 p., illus., \$8.50. Concerned with the actual business of ship salvage operations, covering the techniques, equipment and hazards of strandings, sinkings and rescue towing.

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**MOON MAPS**: With a chart showing the other side of the moon based upon the Soviet photographs—H. P. Wilkins—Macmillan, 36 p., 27 maps, \$6. Detailed moon maps in a form suitable for use at the telescope, on a scale of 55.4 miles to the inch. Alphabetical list of all named objects, giving principal features.

**NEUROPHARMACOLOGY**: Transactions of the Fifth Conference—Harold A. Abramson, Ed.—Macy, 251 p., illus., \$6. Group discussions on specific aspects of the effects of chlorpromazine, reserpine, and serotonin.

**1960 CONFERENCE PROCEEDINGS**: Fourth National Convention on Military Electronics, June, 1960, Washington, D. C.—Craig M. Crenshaw, Chmn., Technical Program Comm.—Professional Group on Military Electronics, Inst. of Radio Engineers, 629 p., illus., paper, \$5. Contains all unclassified papers, and lists titles and authors of classified papers presented.

**THE PAGEANT OF MEDICINE**—Felix Marti-Ibanez, Ed.—Farrar, Straus, 360 p., \$6. This anthology of selected material first published in MD, the medical newsmagazine distributed to doctors, covers wide range of human activity.

**PROPULSION SYSTEMS FOR SPACE FLIGHT**—William R. Corliss—McGraw, 300 p., illus., \$10. Treats the technology of space propulsion from turbojets to photon propulsion, with emphasis on the more advanced nuclear and electrical propulsion systems.

**PUERTO RICO: Island of Promise**—Ruth Gruber—Hill & Wang, 216 p., photographs, \$3.95; paper, \$1.95. Sympathetic introduction to the Commonwealth of Puerto Rico, its people, institutions, mores and emigrants.

**THE REAL PROJECTIVE PLANE**—H. S. M. Coxeter—Cambridge Univ. Press, 2nd ed., 226 p., paper, \$3.75. Reprint of 1955 second edition, paperback.

**SOLID PROPELLANT ROCKETS**—Clayton Huggett, C. E. Bartley and Mark M. Mills—Princeton Univ. Press, 167 p., illus., paper, \$2.45. Covers combustion of solid propellants and solid propellant rockets, for students and research engineers.

**A SURVEY OF BASIC MATHEMATICS**—H. G. Apostle—Little, 464 p., \$6. A year's course to meet the mathematical needs of liberal arts students, with enough emphasis on technique to equip student to begin with technical college mathematics if he wishes.

**SURVIVAL AT SEA: The Development, Operation and Design of Inflatable Marine Lifesaving Equipment**—G. W. R. Nicholl—Adlard Coles (de Graff), 166 p., illus., \$6. Lieutenant-Commander of the Royal Navy presents historical background, operational development and design of modern inflatable lifesaving equipment.

**TRANSACTIONS OF THE VACUUM METALLURGY CONFERENCE, 1959**—Rointan F. Bunshah, Ed.—N.Y. Univ. Press, 212 p., illus., paper, \$7.50. Papers on new research and advanced engineering information in vacuum metallurgy.

**TRANSISTOR CIRCUIT ANALYSIS AND DESIGN**—Franklin C. Fitchen—Van Nostrand, 356 p., \$9. Designed for one-semester course, concentrates on information an engineer needs to solve circuit design problems most likely to be encountered.

**THE TRUMPETER SWAN: Its History, Habits and Population in the United States**—Winston E. Banko—U.S. Fish & Wildlife Service (GPO), 214 p., illus., paper, \$1. Comprehensive report on the trumpeter, from early historical notes to recent breeding and migration records, covers habitat and life cycle, population dynamics and management data.

Science News Letter, July 16, 1960

#### DENTISTRY

### Tooth Decay Reduced Among Puerto Ricans

**TOOTH DECAY** among Puerto Rico's children has been decreased 65% with the help of fluorine chloride in the Commonwealth's drinking water. Public health officials report that better nutrition, increased dental service to school children and better health habits have also helped reduce decay. Begun in 1953, Puerto Rico's fluoridation program has cost \$641,000 so far, covering all but seven towns.

Science News Letter, July 16, 1960

## Do You Know

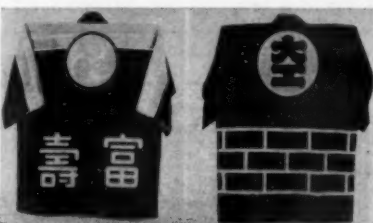
The Army has developed an all-purpose *rust preventive* that can be painted on metal surfaces; it is fireproof, anticorrosive and has no disagreeable odors.

*Female insects* have more blood than males and have higher levels of proteins and amino acids in the blood, presumably because of their egg-laying responsibilities.

Estimates indicate the world's supply of *coal and oil* will last about 100 years if used at the present rate.

Scientists can now detect *meteors* as small as one-millionth of an inch in size and a ten-millionth of a gram in weight—one-hundredth the size previously detected by radar.

Acetylsalicylic acid, the chemical name for modern *synthetic aspirin*, was first used in medical practice in 1899 to treat rheumatic diseases.



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## Questions

**BIOCHEMISTRY**—What are the two theories regarding the role of chlorophyll in photosynthesis? p. 35.

**METALLURGY**—What materials have been grown as single crystals by the modified Verneuil process? p. 36.

**TECHNOLOGY**—How much weight will the Solaris robot lift? p. 39.

Photographs: Cover, National Aeronautics and Space Administration; p. 35, Corning Glass Works; p. 37, Harvard University; p. 39, Vitro Laboratories; p. 42, Science Service; p. 48, Gong Bell Mfg. Co.

The formation of a *blood clot*, which normally takes from six to nine minutes, is a many-linked, chemical chain reaction.

## —ASTRONOMY—

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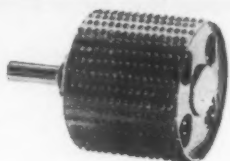
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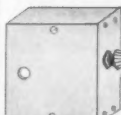
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## CHEMISTRY

### Chemical May Protect Citrus Trees From Frost

A GROWTH-REGULATING CHEMICAL  
has been found to put trees into temporary  
dormancy in which the trees can withstand  
lower temperatures. The two-year tests  
made by the Florida Citrus Commission  
and the University of Florida Citrus Ex-  
periment Station were reported by United  
States Rubber Company, manufacturer of  
the chemical MH-30. Further tests are  
planned before the chemical will be con-  
sidered for use to protect citrus trees from  
frost damage.

Science News Letter, July 16, 1960

## NUTRITION

### "Moon Gardens" Grown By Teen-Age Scientists

TEEN-AGE SCIENTISTS in 47 states and  
three foreign countries are attacking the  
menu problems of space travelers by grow-  
ing "moon gardens," according to Republic  
Aviation Corporation. The company, lo-  
cated in Farmingdale, N. Y., is conducting  
its own experiments on raising vegetables  
under low atmospheric pressure "as  
might be encountered in a lunar green-  
house. A handbook on moon gardens,  
which the company published for young  
scientists, has been requested by about  
1,500 persons.

Science News Letter, July 16, 1960

## EDUCATION

### Efficiency Eliminates Creativity for Students

HIGH SCHOOL biology instruction today  
"eliminates every creative vestige" in stu-  
dents because it is too efficient, too orga-  
nized and too precise, according to Dr. Robert  
W. Merriam, zoologist at Columbia  
University.

He writes in the American Institute of  
Biological Sciences Bulletin, June 1960, that  
individuality and independence in student  
research, particularly in the laboratory,  
should be encouraged.

Dr. Merriam adds that the teacher  
"saddled with the conception that a pro-  
gram is no better than its accessibility to  
grading would not be interested in this  
approach."

Science News Letter, July 16, 1960

## MEDICINE

### Tumor Transplanted in Mice of Different Strains

ADDITIONAL INSIGHT into the prob-  
lem of transplanting tissue from one indi-  
vidual to another has been gained through  
acceptance of a tumor by a mouse joined to  
another mouse of a different strain.

Dr. Robert A. Good of the University  
of Minnesota reported the mouse tumor  
transplant at the Clifford D. Sweet Seminar  
in Oakland, Calif., sponsored by the  
medical staff of Children's Hospital of the  
East Bay.

So far, transplants in humans are limited  
to special instances in which the rejection  
reaction cannot function effectively.

Science News Letter, July 16, 1960



## GEOLOGY

# Mohole Drilling Tests

AN AREA planned for the drilling experiments of the Mohole project will be surveyed in August. The survey is a preliminary step toward the drilling of a hole through the earth's crust.

The survey will be conducted in a 40-mile-square area off Guadalupe Island. This Pacific area has been narrowed down from a much larger area originally surveyed off the Mexican coast.

It is now "pretty definitely" planned as the site of experimental drilling in early 1961.

The experimental drilling will test equipment and theory before the big drilling when the earth will be pierced to its mantle. However, the area to be surveyed may not necessarily be used for the final drilling of the Mohole.

The survey will be made from the Orca, a ship of the Scripps Institution of Oceanography in La Jolla, Calif. Willard Bascom will lead the survey. He is project director of the National Academy of Sciences' AMSOC Committee, which is running the Mohole project.

The survey is designed to "reconfirm" the proposed experimental drilling site, a member of the Mohole team reported.

In this area, the mantle lies about three miles below the ocean floor.

Present drilling equipment can go to this depth. If the drilling were done on land there would be few problems. But the mantle is deeper than three miles under the continents. Thus the drilling must be done from a barge. The drilling rig must go through 1,200 feet of water before it hits the ocean bottom.

All the foreseeable problems—such as underwater currents that may bend the drilling rig and surface currents that may move the drilling ship—have been met on paper. "Mathematically," the experimental holes have already been drilled.

The theory and the math will meet their test next year in experimental drilling.

Besides testing theory, the experimental drilling will explore the depth of sediment in various spots. The drilling will also determine whether Mohole should be drilled at or on top of a ridge in the ocean or a valley.

The preliminary drilling will be shallow. It will not come near to piercing the earth's crust. But the preliminary drilling is expected to give man new knowledge about ocean silt and to bring up some material from the earth's upper crust.

Up until now, scientists have relied largely on outcroppings, earthquake waves and explosions for information about the interior of the earth. The slender Mohole drill may change that.

Cores taken from the hole should shed light on the origin of the earth and its evolution. The cores may provide an uninterrupted record of the earth's development for two billion years.

The project takes its name from the Moho, an irregular dividing line between the crust of the earth and its mantle. The crust may be as deep as 32 miles below continents. Under the crust, the mantle extends 1,800 miles. The mantle's rock is believed to be in a plastic state.

In the center of the earth is a nucleus or core with a radius of 2,160 miles.

Science News Letter, July 16, 1960

## GEOLOGY

## Mohole Project Gets \$6.70 From Cave Creek

AS THE SCHOOL TERM ended, the 64 children and three teachers of Cave Creek Elementary School 93 in Cave Creek, Ariz., looked at their graph on the progress of Mohole, the project to drill, under the ocean, through the earth's crust.

The hole, several miles deep, is expected to give man his first "look" into the interior of the earth.

The graph of drilling had no notations.

Then the children read a report saying funds were needed for the Mohole project. According to Mrs. Carlene Sampson, the school's head teacher, the youngsters pitched in and contributed a dime each.

The school sent a money order of \$6.70 to SCIENCE SERVICE and the funds were transferred to the AMSOC Committee of the National Academy of Sciences in charge of Mohole.

Gordon Lill, chairman of the AMSOC Committee, wrote to the Cave Creek school: "The AMSOC Committee greatly appreciates the kind thoughts of the Cave Creek Elementary School about the Mohole project. We are delighted to have your support and interest."

The Committee has a fund for private contributions that adds considerably to the support provided by the National Science Foundation and the Army. Industrial Distributors (1946) Ltd. of the Union of South Africa is supplying all drilling diamonds free. Christensen Diamond Products Co. of Salt Lake City, Utah, is setting the diamonds free.

But Mohole leadership decided against promoting a "Children for Mohole" campaign. Actually, the Mohole project now has reasonably good prospects for financial support, both private and governmental. But as a project employee said:

"I think this letter is wonderful. Every little \$6.70 counts."

Science News Letter, July 16, 1960

## INVENTION

# Gibberellin for Animals

GIBBERELLIN, a non-antibiotic material that increases the growth rate of plants, may be added to animal feed to give better and faster yields.

John R. De Zeeuw, Gerald A. Donovan and William C. Sherman, all of Terre Haute, Ind., were awarded patent No. 2,943,938, one of 932 patents issued in Washington, D. C., for this use of gibberellin. They assigned it to Chas. Pfizer and Co., Inc., of New York.

They said the addition of very small amounts of gibberellin, between one part in a billion and one in a million, is effective in increasing the growth rate of poultry and is also effective for cattle, sheep, pigs, lambs and other farm animals.

The use of various hormones, and of antibiotics, in animal feeds is not new but, according to the inventors, gibberellin, a term they use to include the three compounds known specifically as gibberellins A-1, A-2 and A-3, is much more effective than such previously used materials as penicillin and stilbestrol in promoting growth.

Since it is not an antibiotic, gibberellin does not reduce the incidence of disease, as does penicillin for example, so these other additives may still be necessary in some cases.

Science News Letter, July 16, 1960

## INVENTION

## Tobacco-less Cigarettes With Improved Taste

CIGARETTES have been made from corn-silk and alfalfa before, but, according to Gerald M. Schaflander of Fresh Meadows, N. Y., they have all had a rather acrid taste. Such smoking mixtures, however, have very little tar and no nicotine at all.

Mr. Schaflander has discovered a means of removing these unpleasant properties according to which the mixture is washed with water and then treated with steam which extracts the chemicals responsible for the acidity. The inventor assigned his patent, No. 2,943,958, to Bantob Products Corp. of New York.

Science News Letter, July 16, 1960

## CONSERVATION

## Home for the Birds Inside a Tractor

THERE IS NO PLACE like home . . . to a wren . . . even if home is inside the brake and clutch housing of a tractor.

Farmer Whitson Moss reported finding a fully occupied wren nest inside his tractor, which is in daily use. The mother wren enters her mobile nest through the clutch and brake pedal holes. She has successfully hatched her eggs amid all the moving machinery.

Apparently mother wren and her brood are none the worse for the precarious experience.

According to the Missouri Conservation Commission, "Wrens are notorious for selecting odd nesting sites." But the nest in the tractor appears to be the oddest of all in the conservation annals of the "Show Me" state.

Science News Letter, July 16, 1960

# New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 1048. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

**AIR-POCKET PILLOW**, a new type of foam pillow, is made of multi-celled urethane foam cored with dozens of internal air pockets. These air pockets enable air to circulate easily, providing a cooling effect as well as extra softness and resilience.

Science News Letter, July 16, 1960

**CLOVER LEAF SUN UMBRELLA** decorates porch, patio or swimming pool while offering protection from the sun. The clover leaf sunshade, available in any combination of four different colors, consists of four flat, circular aluminum leaves, each 48 inches in diameter.

Science News Letter, July 16, 1960

**"HOME OFFICE"** hides a typewriter in an attractive lamp table. When the top is raised, a spring mechanism is released which lifts the typewriter on its platform to typing height. The platform draws forward and side leaves open out for work space. Supplies are handy in large drawers.

Science News Letter, July 16, 1960

**MECHANICAL BASS**, shown in the photograph, enables children to battle fighting fish right in their own bathtubs. The plastic bass floats about until the fisherman hooks him, triggering a mechanism in the bass's mouth. Then the bass, spring-wound



by its fins, puts up a fight. The fish comes complete with rod, reel, line and lure.

Science News Letter, July 16, 1960

**"SUNDAE" TOOTHBRUSHES**, designed to make dental hygiene fun for youngsters, are colored and scented to give the im-

pression of ice cream flavors. The brushes come in chocolate, vanilla, strawberry, lemon, lime and orange. Although the odor is impregnated in the handle, in actual brushing little or no flavor can be detected.

Science News Letter, July 16, 1960

**FLASHLIGHT PEN** can write in the dark. The translucent lower half, equipped with small light bulb, acts as a flashlight, or can be used for writing in the dark. The bulb and battery may be easily replaced by the user.

Science News Letter, July 16, 1960

**TEMPERATURE-INDICATING MATERIALS**, crayons and paints, change color to indicate changes in temperature of any hot surface. They are for use in any industrial or commercial application where temperature and its correct determination are important factors.

Science News Letter, July 16, 1960

**"CLOSE-UP" TV UNIT** enables viewer to enlarge the picture image on his TV set by remote control. When the close-up button is pressed, a transistor-powered signal is beamed at the television receiver, and the center of the image is instantly increased on the viewing screen by 25%.

Science News Letter, July 16, 1960



## Nature Ramblings



By HORACE LOFTIN

WITH ALL DUE RESPECT for our feathered friends, it must be admitted that birds are not very bright. Indeed, the dumbest mammal is probably a mental giant in comparison with the smartest bird.

But this is not to berate the birds for being stupid. What they lack in ability to learn—that is, intelligence—they make up for by their high degree of instinct—unlearned behavior. As an eminent scientist has remarked, we may call a person who is slow to learn a "bird-brain"; but birds could, with equal disdain, call a clumsy nest-making bird a "man-brain".

Birds, in common with many lower animals, rely on inherited knowledge to carry out their daily activities. When a certain season approaches, the bird automatically seeks out a nesting site, collects building materials and builds a nest typical of its species. He does this instinctively.

Even a bird's song is instinctive in most cases. The intricate mating behavior and

### Built-In Education



the care of young all involve inherited instinct.

Of course, this does not mean that birds are automatons. Instinctive behavior can certainly be altered to some degree by experience. A bird's second nest most likely will be better than its first one, for example. Parrots can learn a sizable vocabulary of highly picturesque words. Crows are especially noted for their high avian I.Q.

Even the humble English sparrow must be credited with a certain keenness. Last

summer, in a trapping and banding experiment, a scientist easily caught a large number of sparrows in a simple trap baited with bread. But this spring, hardly a bird could be caught. Some sparrows were actually entering the trap, removing the bread and eating it safely outside. What was the difference? Last summer's birds were newly off the nest. This spring's sparrows had profited from several months of experience—they had learned caution.

Even so, learning plays a minor role in the daily life of birds when compared to the overriding importance of instinct. The basic difference between birds, with instinctive behavior, and mammals, with learned behavior dominant, is clearly seen in the make-up of their brains.

In mammals, the upper part of the fore-brain tends to be enlarged, ending in the massive cerebrum of human beings. This is a center for learning. In birds, the lower portion is more highly developed and is a center for instinctive behavior control.

Science News Letter, July 16, 1960

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